**Cellular Basis of Life Review Sheet**

**History and Introduction to the Cell**

* The cell is the smallest unit that can carry on all life processes.
* According to the cell Theory:
  + All living things are composed of cells.
  + Cells are the basic unit of structure and function.
  + Cells come from the reproduction of other cells.
* The ratio of surface area to volume determines the size of a cell.
  + When cells get too large they can no longer take in nutrients or exchange wastes.
  + Cells are measured in units called micrometers.
  + Some cells like nerve, egg or white blood cells can become larger due to a unique shape or function.
* Cells can be one of two types; prokaryotic or eukaryotic
* prokaryotic cells are found in bacteria/archaea and contain DNA and ribosomes.
* eukaryotic cells are in found in animals, plants, fungi and protists and do have

a nucleus and membrane-bound organelles.

**Parts of the Eukaryotic Cell and Plant Features**

* The cell membrane is a selectively permeable boundary composed of a phospholipid

bilayer with proteins and carbohydrates moving within it.

* + It contains peripheral proteins on one side and integral proteins that extend

the whole way through the membrane.

* + It regulates the passage of materials such as nutrients, wastes and ions.
  + It regulates cytosol components like salts and minerals to maintain homeostasis.
  + It serves as a site of identification and connection to other cells.
* All eukaryotic cells contain parts or organelles with specific functions:
* Mitochondria to produce energy in the form of ATP.
  + A nucleus to store information in the form of DNA. It is the control center of

the cell and contains the nucleolus to make RNA.

* + Ribosomes to produce proteins found on the rough ER which transfers them to the

Golgi apparatus for modification/packaging into vesicles to leave the cell.

* The smooth ER makes phospholipids and proteins that remain in the cell.
* The cytoskeleton has microfilaments for movement and microtubules for support.
* Animal cells have some organelles in large number compared to plant cells.
  + They have many lysosomes to break down wastes and pathogens.
  + They have cilia or flagella for movement.
  + They have centrioles to guide chromosomes during cell division.
* Plant cells have three parts not found in animal cells.
* They have a cell wall for structure and support.
* They have a large vacuole to store water and wastes.
* They have plastids to store light-absorbing pigment, starch and fats.

**Chemical Basis of Life Review Sheet**

**Chemistry**

* Elements are composed of atoms and gain stability by forming ionic or covalent bonds.
  + Elements bond together chemically to form compounds using electrons in the

outer ring. They want to have 8 electrons in this outer ring.

* + Ionic bonds form when only 1 or 2 electrons are transferred between ions.
  + If more than two electrons are involved they are shared and the bond is covalent.

**Water Properties**

* Water is a polar compound because the oxygen is slightly negative and the hydrogen is

slightly positive in charge. This gives the molecules several important properties.

* It can dissolve other polar substances like ionic compounds, sugars and proteins.

But it cannot dissolve non-polar substances like lipids.

* It allows for the formation of hydrogen bonds between water molecules where the

slightly positive H of one is attracted to the slightly negative O of another.

* It provides cohesive forces for surface tension and capillarity.
  + Water is important to organisms for many reasons related to temperature due to its

high specific heat that relate to maintaining homeostasis.

**Carbon Compounds**

* Carbon is the main element that is found in organic compounds.
  + it can bond to four other elements including functional groups.
  + it bonds to itself and can form single, double or triple bonds.
  + it forms straight chains, branched chains or ring structures.
* Condensation reactions convert monomers into a polymer and water.
* Hydrolysis reactions use water to split a polymer into several monomers.

**Molecules of Life**

* Carbohydrates are composed of the monomer building blocks called monosaccharides.
  + Monomers have the C, H and O in a 1:2: 1 ratio.
  + Monomer examples are glucose, fructose and galactose.
  + The monomers form dimers such as lactose, maltose and sucrose.
  + The monomers form polysaccharides such as starch, cellulose and glycogen.
  + They are used for fuel that is converted to energy.
* Proteins are composed of the monomer building blocks called amino acids.
  + There are twenty different monomers based in different “R” groups.
  + The monomers form chains called polypeptides.
  + They are used to make hormones and structural components.
  + All enzymes are proteins. These chemicals control reaction rates in organisms.
* Lipids are composed of the monomer building blocks called fatty acids.
  + The monomers can be saturated or unsaturated forms.
    - saturated forms have all single bonds, are solid and animal based.
    - unsaturated forms have double/triple bonds, are liquid and plant oils.
  + The monomers plus alcohol form lipids like triglycerides, phospholipids & wax.
  + They are used to make cell membranes, steroids & for long-term energy storage.